Thirty Years of Preserving, Discovering, and Accessing U.S. Agricultural Information: Past Progress and Current Challenges

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Abstract

This paper describes past preservation efforts with agricultural literature in the United States, as well as current projects, challenges, and trends. Starting in the early 1990s, preservation of U.S. historical agricultural publications experienced a period of coordinated scholarly evaluation and funding. In 1993 the combined efforts of the United States Agricultural Information Network and librarians at Cornell University's Albert R. Mann Library produced the National Preservation Program for Agricultural Literature. It was an ambitious effort to save the nation's historical print-agricultural literature from deterioration. This effort ranged from nationally significant scholarly works, such as the Core Historical Literature of Agriculture, to significant state and local literature. A multiphase project on state and local literature was funded by the National Endowment for the Humanities (NEH). Later, in the wake of the nation's financial crisis of 2008, NEH-sponsored funding ended and staffing levels in many libraries declined as the large-scale digitization of library collections was being undertaken by Microsoft and Google. With the advent of HathiTrust Digital Library and other collaborative efforts, the challenges and opportunities for preserving and accessing the nation's agricultural literature have evolved and changed dramatically. Today, new partnerships and initiatives around the country, such as the Center for Research Libraries–sponsored Project Ceres, are continuing and refocusing earlier efforts.

Introduction: The Value of Agricultural Literature

In the early 1950s an immigrant viticulturist named Konstantin Frank was determined to establish European varieties of the wine grape *Vitas*

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vinifera in the northeastern United States. At the time this was generally considered impossible by the viticultural community because previous attempts with *V. vinifera* had failed, supposedly due to a lack of hardiness for cold winters. Having grown such vines in his even colder native Ukraine, Frank sought proof to the contrary. Poring over numerous old experiment station publications in the library of the New York State Agricultural Experiment Station in Geneva, New York, he discovered Bulletin no. 432: Vinifera *Grapes in New York* (Anthony, 1917). The publication was full of procedures and techniques for developing winter-hardy rootstock and descriptions of trials on specific varietals. Subsequently, Frank discovered that some of the *V. vinifera* vines described in the bulletin were still alive at the station, having survived decades of brutal upstate New York winters. In a historical state-agricultural publication he had found his proof for what would become a lifelong crusade to promote *V. vinifera* in the northeastern United States wine industry (Russ, 2015).

Past agricultural practices and experiences continue to influence current agricultural operations at the global, federal, state, and local levels, as well as business, social, and personal interests. A great deal of recorded past practice is still useful, applicable nearly everywhere, and it is particularly welcome in rural and developing areas that may be lacking ready access to information. Federal and state publications often provide diagrams and detailed plans for constructing wells, fences, and structures, such as the United States Department of Agriculture's (USDA) farmer's bulletins and numerous experiment station and extension bulletins. Many examples of these publications are collected online in the National Agriculture Library's (NAL) Organic Roots Collection, whose purpose is "to ensure the sustainability and longevity of today's small farms" (NAL, n.d.). These sources of information are freely accessible to everyone, ranging from the home-gardening hobbyist, to small-farm owners, to lab researchers working for agricultural corporations.

During the pre-Prohibition era the cultivation of hops was well documented and detailed, as was the industrial use of hemp before World War II. Both of these crops have seen a resurgence of interest and investment in recent years, along with research into farming methods in use before the adoption of the extensive use of pesticides, herbicides, and fertilizers. Through the online Biodiversity Heritage Library (BHL), taxonomists can rediscover long-lost varietals advertised in the pages of seed and nursery catalogs during the Victorian era. These findings in turn help to inform geneticists' work to increase the genetic diversity of fruits and crops for disease resistance and hardiness. Historical experiment-station documents are cited in current articles regarding invasive species, such as kudzu (O'Brien & Skelton, 1946). Publications on these topics, preserved by libraries and other agencies, provide a wealth of information that would

otherwise be undiscoverable for researchers, scientists, and entrepreneurs. Past uses of chemicals now determined to be unsafe, such as the insecticide DDT, are also well documented in this kind of literature, providing a view of how information that was subsequently revised or withdrawn was presented to the public. Cases such as these also raise the delicate issue of how to provide both digital access to historical information and communicate to the public that these practices may no longer be recommended or considered scientifically sound. Although there is greater and greater access to information via the internet, one often still has to know how and where to find both historical and current authoritative content despite the oft-heard phrase to "Google it."

Providing access to information for the benefit and education of citizens, especially farmers, has long been at the core of the land-grant mission and cooperative extension in the United States; it has also been fundamental to the mission of the preservation efforts for agricultural literature. A rich vein of research crafted specifically for the public—extension publications—reveals trends and practices in rural America and its social history over the course of more than a century. The Smith-Lever Act of 1914, which formally established cooperative extension, mandated that "cooperative agricultural extension work shall consist of the giving of instruction and practical demonstrations in agriculture and home economics to persons not attending or resident in said colleges in the several communities, and imparting to such persons information on said subjects through field demonstrations, publications, and otherwise" (Smith-Lever Act of 1914). Extension publications often documented nontraditional education efforts in the United States (that is, those not situated specifically in schools and universities). From the perspective of those seeking alternative forms of instruction, these publications show how farmers, homemakers, and children were taught before comprehensive public education was available. Butler's *Raise: What 4-H Teaches Seven Million Kids and How Its Lessons Could Change Food and Farming Forever*, published in 2014 and focused on 4-H programs in California, argues that the extension's information-delivery method of "learning by doing" may be a successful education alternative for students who struggle in the traditional classroom.

The purpose of this paper is threefold: to document the recent history of the preservation of agricultural information, specifically the information produced at land-grant universities as part of their extension missions; to discuss issues related to the coordinated preservation of agricultural information, particularly focusing on the change from microfilming as a preservation method to digitizing as both a preservation and access method; and to identify current challenges to preserving, discovering, and accessing agricultural information.

Literature Review: Preserving, Discovering, and Accessing U.S. Agricultural Information

Preservation is concerned not only with print artifacts, but also their reformatting to microfilm, and in recent decades, digital formats (Skinner, 2010). Preservation requires ongoing maintenance of all formats, including the maintenance of item- or collection-level description either in finding aids or in cataloging metadata to ensure the discoverability and usability of items. All items, regardless of format, require adequate description. The descriptive information provided in a library catalog, finding aid, or repository website lets users know what a collection contains. Adequate description makes archived materials discoverable; without discoverability, or a way into a collection, archived materials are virtually invisible to users. Curated archival collections of print, microfilm, or digitized materials are a way to provide the discoverability of items contained in a collection.

Each preservation format has benefits and liabilities for both libraries and users. Archival print-quality copies and microfilm copies serve as sturdy preservation formats, but neither format is conveniently accessible to users compared to digital access; they require adequate space and climate controls to prevent deterioration. Print requires no specialized equipment: a user can pull a print item and read it without needing a machine or software. Print copies of a particular title may be limited, and a user may have to travel to access it or request and pay for a digital copy of the item. Ideally, preservation-print copies should be printed on archival-quality paper. Digitized materials can serve as convenient access copies for users, but notable challenges exist in using digitization as a preservation method. The preservation of digital formats is an ongoing issue due to a lack of standards regarding long-term access: without an internet connection, appropriate computer software, or web browser to enable display, digital formats are useless. Format migration for digital files is an ongoing preservation requirement for the medium, with formats, and the programs required to read them quickly, becoming outdated and obsolete. Despite its limitations, microfilm is still considered a preferred format for long-term preservation (Chapman, Conway, & Kenney, 1999).

Preserving agricultural information became a serious concern in the United States during the 1980s, when a broader understanding of the deterioration of materials printed on brittle, acidic paper began to be addressed by the preservation community. The need for a coordinated response to this challenge became something of a crisis, when an estimated 75 million books in Association of Research Libraries (ARL) institutions were deemed "imminently at risk of being lost because of their deteriorated physical state" (ARL, 1988). In 1988 the United States Agricultural Information Network (USAIN) was formed to provide a forum for discussion of agricultural information issues, including those related to the preservation of agricultural information (Thomas, 1989). Its membership includes

agriculture librarians who work at land-grant institutions throughout the United States and at universities in Canada and Latin America. USAIN

> is an organization for information professionals that provides a forum for discussion of agricultural issues, takes a leadership role in the formation of national information policy as related to agriculture, and makes recommendations to the National Agriculture Library on agricultural information matters, and promotes cooperation and communication among its members. (USAIN, n.d.)

In 1991 a USAIN-led plan was proposed for a national effort to preserve the literature of agriculture. The National Preservation Program for Agricultural Literature (NPPAL) was researched by an advisory panel on preservation appointed by USAIN. The plan's report was written by Nancy Gwinn, the associate director of Collections Management at the Smithsonian Institution, and approved by USAIN members at its conference in 1993. A USAIN-appointed steering committee was formed to develop funding and provide guidance for the program (Gwinn, 1993). It was intended that the steering committee should appoint a national coordinator who would establish NPPAL and subsequently hand it over to NAL to coordinate and administer for the long term: "USAIN does not expect NAL to carry the entire burden of preservation of agricultural literature for the nation. . . . USAIN members are eager to join with NAL in a combined effort, with NAL both supplying a portion of the preservation effort and eventually coordinating the national program" (Gwinn, 1993). However, by early 1995 it was clear that the appointment of a national coordinator required a rather ambitious level of funding, and that with a new NAL director only recently appointed, it would be difficult to establish a preservation program at the library. Consequently, the steering committee considered alternatives to make progress on the preservation of agricultural literature. Since Cornell University's Mann Library had the available preservation staff, expertise, and willingness to take on the state and local literature component of the program, its staff submitted the grant proposals that followed.

NPPAL outlined the concept that the literature of agriculture is divisible into genres (see fig. 1). It designated "scholarly monographs and serials" as the responsibility of Mann Library, where staff members had already completed the identification of the historically significant monographs and serials for what would become the Core Historical Literature of Agriculture (CHLA) collection. Mann Library began preserving CHLA materials in 1994. Two additional genres of the literature identified as priorities for preservation were "state and local documents" and "popular and trade journals." Most of the other genres of the literature were seen as either NAL and/or local responsibilities. In both cases—for the state and local documents and popular and trade journals—NPPAL indicated that each state would take responsibility for the preservation of materials pro-

duced by its land-grant institutions, with some coordination and assistance from the national level. As with the scholarly monograph genre, Mann Library had completed the preservation of its state documents, as well as the identification of its region's popular and trade journals.

Due to its permanence, microfilming has been the preservation standard for the past several decades; microfilming for access and lending purposes has been in place for much longer. For example, NAL began filming agricultural titles to make material and information rapidly available to USDA workers in 1934 (Morhardt, 1957). However, specifications for using the method as a long-term preservation solution were not established until the 1970s. While NAL led a cooperative project among land-grant university libraries from 1974 to 1987 to microfilm titles in agriculture, forestry, and cooperative extension (Gwinn, 1993), a wealth of material in need of preservation was not "realistically evaluated or preserved in the agricultural sciences" (Olsen, Bellamy, & Stanton, 1991, p. 271). By 1993 there still had been "no systematic approach to preserving the important historical literature of the agricultural sciences" (Gwinn, 1993, p. 6). However, a method of identifying the historical agricultural literature had been implemented in 1988 at Mann Library when senior research associate Wallace Olsen began the core literature project (Kennedy-Olsen, 1989). Olsen was a proponent of whole-discipline or domain-based preservation practices, described in an *Abbey Newsletter* article as a systematic, coordinated effort where the identified literature of a subject or domain is preserved across institutions and preservation formats ("The Idea of Whole-Discipline Preservation," 1994).

With funding from the Rockefeller Foundation, Olsen assembled groups of scholars from Cornell and across the United States to identify the core books and journals in the broad range of subjects relating to agriculture, primarily published after 1950, but including materials dating back to the 1820s. The first step involved the identification of the universe of titles by Library of Congress subject areas through extensive database searching, and then creating bibliographies from results lists. From these massive bibliographies, scholars evaluated texts within their respective fields of specialization, ranking works based on a range of criteria that relied heavily upon citation analysis and literature reviews. With a focus on the systematic preservation of the literature of each discipline, the bibliographies that emerged from this process yielded priority-ranked lists of titles that were not based on the holdings of any particular collection (Olsen et al., 1991). Olsen detailed this selection and ranking methodology across several chapters in the first of a seven-volume series titled *The Literature of the Agricultural Sciences*, published between 1991 and 1996. "Collection evaluation is important in library management," Olsen noted, "in order to measure the merits of a collection, its uniqueness, and potential national, local, or regional significance" (p. 269).

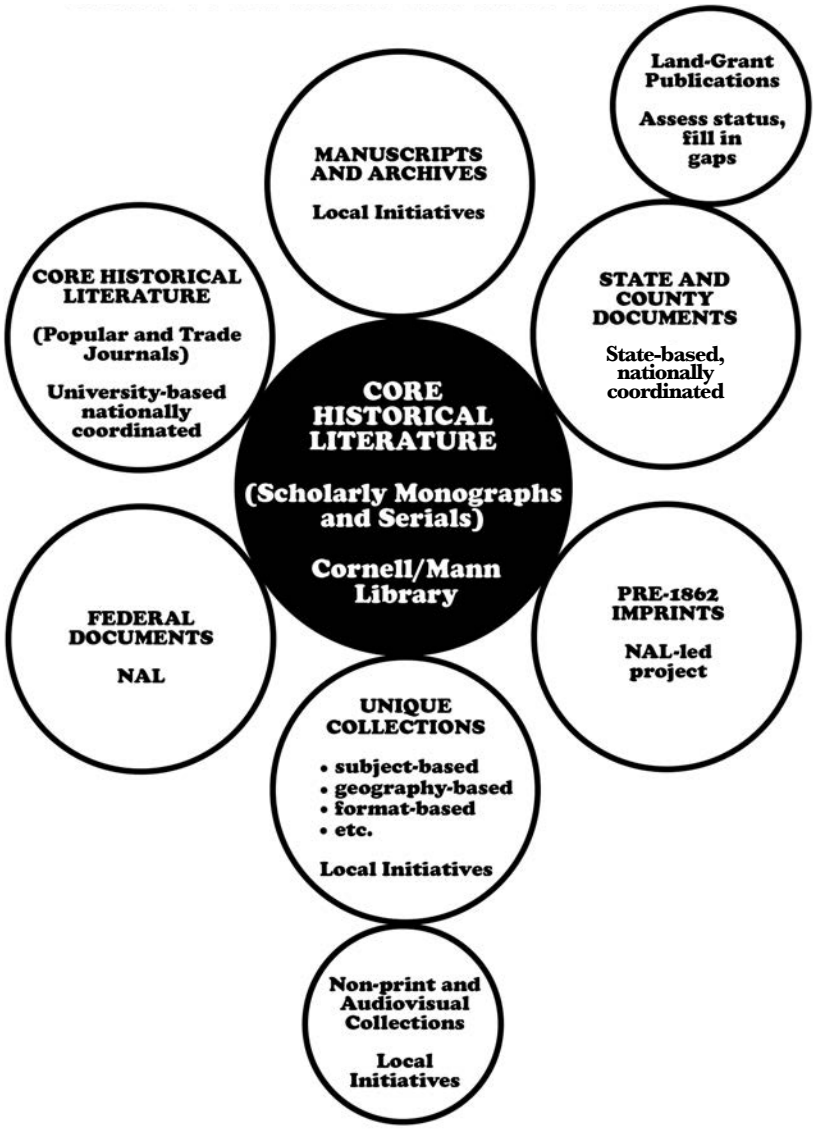

Figure 1. NPPAL's preservation priorities and responsibilities. (Source: N. E. Gwinn, "A National Preservation Program for Agricultural Literature" [1993], p. 14.)

This systematic, evaluative approach to preservation guided much of the work done in the land-grant library preservation community for the next two decades, largely under the assumption that inadequate funding would prohibit wholesale preservation of all materials in disciplines, regardless of scholarly value. "There is little doubt," Olsen wrote just before the dawn of the internet, "that with current technology and funding only a relatively small percentage of agricultural literature will be preserved in a permanent manner. It will be better to have a valuable, minor portion preserved than to try to preserve every piece of paper, much of which is of questionable value" (Olsen et al., 1991, p. 271). From a discovery perspective Olsen's identification of the full scope and extent of agricultural literature published in the United States provides users with a set of documents to search for and find, and provides preservation and agricultural librarians a title list to use to prioritize preservation efforts.

Microfilming and Digitizing Agricultural Information: The NEH Years, 1996–2008

The USAIN preservation steering committee began to focus on the coordinated work required to identify and preserve state and local documents. Popular and trade journals, although considered important, were deferred because of the complexity of filling gaps in many publications as part of the preservation initiative. Another component of NPPAL sought to preserve and improve access cooperatively to a critical mass of state and local publications identified as significant. To accomplish this in a diverse cross-section of states, Olsen's selection and ranking methodology was adopted for the project. The steering committee prepared a proposal to secure funding for a preservation project for state and local documents involving a representative group of geographically diverse states. This proposal was submitted to the National Endowment for the Humanities' (NEH) Division of Preservation and Access. In July 1996 the proposal, titled *Preserving the History of United States Agriculture and Rural Life: State and Local Literature, 1820–1945*, was funded for $850,000, an amount enough to allow nine participating states to identify and rank their literature; of these, four were funded to microfilm titles accorded highest priority. Mann Library submitted the proposals and was the project sponsor responsible for administering the total project on behalf of USAIN and the states involved. The NEH awarded nearly $4.5 million to its six phases, from 1996 to 2008, and a total of twenty-nine states participated in at least one of the phases.

The original intent of NPPAL was to submit a series of proposals to the NEH every two years until all fifty states were able to draft bibliographies of their state and local documents, and then complete the microfilming or digital preservation of the documents. Each proposal provided funding for a set of states to identify and rank their literature through the creation of bibliographic essays, and for a set of states to preserve its top ranked

materials. States that did not receive funding for preservation work in one phase were automatically included in a subsequent phase to complete the cycle. In sixteen of the states the scope of this undertaking was large enough to warrant participation in two phases. Most of the libraries that participated in the preservation portion of the project used preservation microfilming as their reformatting option.

The work conducted in each phase of these projects was significant. Each state needed to hire and/or train all the staff necessary to create a comprehensive bibliography for its literature, rank the titles via citation analysis and input from scholars, write an essay on the state's history of agriculture, and finally to microfilm hundreds and in some cases thousands of bound volumes. The initial plan of work for the project was organized so that the first phase produced a systematic bibliographic analysis and evaluation of the materials, with priorities for preservation determined by a team of scholars and librarians. This stage of the project included the following steps:

- Defining the scope of the literature
- Compiling a bibliography of the universe of publications within scope
- Conducting scholarly evaluation of the bibliography (ranking of citations)
- Setting preservation priorities for the body of literature

Each state preserved the top-ranked 25 percent of titles identified in this process. Preservation microfilming workflows involved

- pulling materials;
- evaluating the item's condition for filming (checking for binding issues, brittleness, completeness, damage, and so on);
- disbanding volumes if necessary;
- paginating;
- preparing for shipment to the microfilming vendor;
- post filming inspection of all three generations of the microfilm; and
- cataloging and storing of film.

For the first five phases of the project, microfilming was the only reformatting option that the NEH would fund. After much discussion it agreed to fund projects that offered libraries undertaking the preservation portion of the project two reformatting options: preservation microfilming or digital imaging. Phase 6 was the only phase of the project to offer these options, and as a pilot, two libraries—the University of Arizona's and Colorado State University's—digitized their most important titles. With the completion of phase 6, a total of 22,417 monographic and serials titles in 37,289 volumes were preserved on microfilm or in digital formats.

In 2007 Mann Library submitted a proposal to the NEH to fund phase 7, which was to run from 2008 to 2010 and include the digitization of 1,400

volumes identified in the bibliographies created earlier by Connecticut and South Dakota; bibliographic projects were planned for Alaska, Massachusetts, Tennessee, and Vermont. Unfortunately, due to significantly lowered award limits and other factors, the NEH did not accept the request for phase 7 funding (see fig. 2).

From Microfilming to Digitizing: Preservation, Discovery, and Access Issues, 2004–2012

Without continued funding, the state and local literature-preservation projects came to a halt. By the time the sixth NEH-funded phase concluded in 2008, several massive high-profile digitization projects began to appear. The projects digitized enormous amounts of published works, and a number of projects focused specifically on agriculture literature. The Google Books Library Project, Carnegie Mellon's Million Book Project/Universal Library, and the Open Content Alliance (hosted by the Internet Archive) partnered with large academic libraries to scan scholarly content (St. Clair, 2008). These digitization projects were what could be called the "clean sweep" or "vacuum cleaner" approach to mass digitization and included a large number of state and local agricultural publications. For example, the University of Michigan's Google-partnered mass digitization project listed in a frequently-asked-questions (FAQ) section that "most of the University Library's bound print collections will be digitized . . . beginning with all volumes in the Buhr shelving facility" (UML, 2005, n.p.). The Million Book Project/Universal Library digitized information using two collection strategies: selecting titles listed in best-books lists for academic libraries, and selecting agricultural information (St. Clair, 2008). A later digitization initiative within the Million Book Project/Universal Library focused on government publications without copyright restrictions. Both the United Nations Food and Agriculture Organization and NAL were approached with partnership opportunities, and a number of academic libraries with substantial agriculture collections expressed interest in the digitization of their collections (St. Clair, 2008). Starting in 2004 the Agriculture Network Information Collaborative (AgNIC), an agricultural information organization that focuses on providing access to online agricultural information collections produced by land-grant intuitions, provided funding to states to digitize small projects of agricultural materials through specific cooperative agreements (AgNIC, 2012). One such project was Texas A&M University Libraries' digitization of Texas Agricultural Agency publications. In 2009 AgNIC awarded Montana State University Libraries funds to digitize and preserve extension service documents.

In 2008 HathiTrust Digital Library began as a collaboration of twelve universities focused on preserving digitized materials. The University of Michigan digitized a large number of state agriculture documents, which were submitted for preservation and archiving in HathiTrust. As other

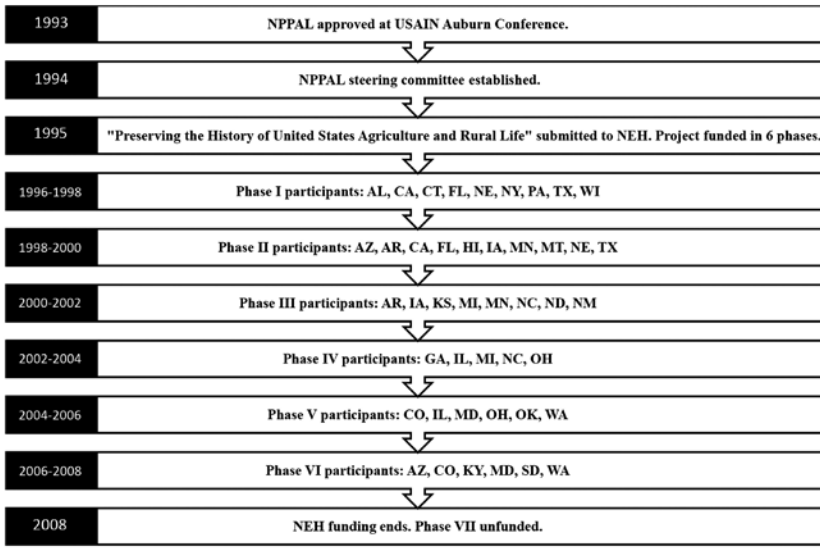

Figure 2. NPPAL's timeline.

libraries submitted digitized collections to HathiTrust, the quantity of agricultural documents increased considerably, sometimes as duplicate and triplicate copies. Despite the inclusion of multiple copies of state and local agricultural documents in HathiTrust, there is no easy way for a user or librarian searching its vast collection to know the extent or completeness of the materials included in the repository. Without the guidance of bibliographic documentation, such as the essays produced by participants in the NEH project, the state and local documents stored in and made accessible by HathiTrust lack the cohesion and contextualization of digital collections organized by state, creator, or library. The NEH bibliographic essays show the relationships among documents, explain the differences between cooperative extension documents and research experiment station documents, and identify the key historical players in the creation of these documents, since these players were usually instrumental in working with early agricultural industries and state governments in adopting new practices and technologies. The post-NEH years provided institutions with ample opportunities to digitize, but without guidelines and best practices, access issues have arisen, collection cohesion has been lost, and many documents currently out of copyright and created by state agencies, such as state extension offices, are restricted from use to varying degrees, depending on the repository in which they are housed. Institutions that are not members of HathiTrust cannot download their own documents, and if the

documents housed in HathiTrust were digitized by Google, rehosting and use restrictions apply (HathiTrust, n.d.-a).

The Olsen curatorial approach developed in the early 1990s was distinct from the so-called vacuum cleaner approach of later large-scale digitization initiatives, such as those noted above (Demas, Paster, & Paulson, 2013). The latter kinds of efforts were extremely well-funded, to an extent unimaginable in the early 1990s, and often made selection decisions independent of librarians. From a strictly preservation standpoint, the results of this approach have been a mixed blessing. Funding for library-led preservation projects was becoming increasingly reduced during and after the economic downturn of 2008. The 2014 preservation statistics report issued by American Library Association's (ALA) Preservation and Reformatting Section and Association for Library Collections and Technical Services shows that funding for preservation in libraries as a portion of total library expenditures never recovered from its decline and fall in the mid-to-late 2000s, as can be seen in figure 3. The information dated 2008 represents reporting from ARL institutions, while 2012 and 2013 data were collected in surveys coordinated by ALA. According to the report's authors, "it is likely that preservation spending, as a percentage of overall research library budgets, has fallen approximately 25% from its peak in 1992" (Peterson, Robertson, & Szydlowski, 2014).

Despite the economic downturn and its effects on preservation, the partnerships that were established between libraries and Google, Microsoft, and others to digitize their collections enabled access to vast troves of resources at a time when it was becoming less financially feasible for libraries to digitize. On the other hand, in the absence of evaluative rankings, the selection for digitization sometimes appears piecemeal; robust cataloging for scanned items has lagged behind the advance of digitization; the quality control of scans has varied greatly; and the permanency of digital assets is not always clear. Despite these problems, what was achieved through these large-scale digitization projects was an astonishing range and depth of content in the agricultural sciences readily available online.

In 2011 USAIN began a partnership with NAL and Center for Research Libraries (CRL) to initiate another phase of the digitization and preservation of U.S. agricultural documents. The partnership, called Project Ceres, complements and builds on the earlier preservation efforts of NPPAL. The project provides funding for land-grant institutions to digitize their research station and cooperative extension documents and preservation opportunities for states whose institutions were not part of the original USAIN–NEH projects. Top preservation priority is given to experiment station and extension service publications, followed by research reports produced by individual departments or programs related to agriculture within land-grant universities. As described in the Project Ceres proposal guidelines included on USAIN's website, institutions that submit propos-

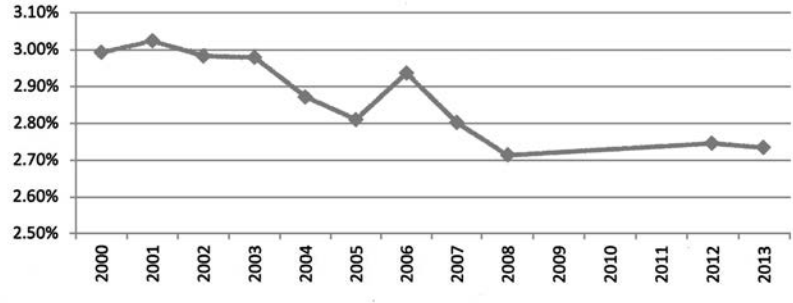

Figure 3. Total preservation expenditures as a percentage of total library expenditures, 2000–2013. (Source: A. Peterson et al., *Preservation Statistics: A Survey for U.S. Libraries—FY2013 Report* [2014], p. 12.)

als for project funding are required to describe levels of metadata available for each collection selected for digitization, and to ensure the preservation of the print or microfilmed copies of each collection.

Project Ceres is one of several funding and collaborative initiatives that focuses on digitization, preservation, and archiving of agricultural documents. One example of these initiatives is CHARM, the Consortium for the History of Agricultural and Rural Mississippi, implemented at Mississippi State University (MSU) in 2002. The consortium was established "to preserve the state's agricultural and rural heritage and to make it accessible to the public" (Brazzeal, 2008, p. 362). Participants in CHARM include the Mississippi Agriculture and Forestry Experiment Station, MSU Extension Services, and several MSU colleges. CHARM carries out its mission of capturing and promoting understanding of the impact of agriculture, forestry, and rural life on the history and development of Mississippi by identifying, collecting, preserving, and providing access to documents and materials that record the history of the agriculture and forestry industries. CHARM also seeks to provide access to the record of African American agricultural and rural history (Brazzeal, 2008). Its collections include both physical and digital collections and online exhibits that feature agriculture-related materials held within MSU Libraries.

CHARM will serve as a model for the Association of Southeastern Research Libraries' (ASERL) Deeply Rooted project. ASERL's website describes the project as "a shared digital collection of primary source research materials describing economic, technological, and social factors significant to the development of agricultural practices, crops, technology, and agrarian life in the southeastern United States" (ASERL, n.d.). The scope of content included in Deeply Rooted is deliberately broad to encourage participation from as many ASERL institutions as possible. Since ten of the association's thirty-eight member institutions are land-

grant universities, it is possible that many documents to be included in the collections will originate in the research experiment station and cooperative extension documents holdings of these universities' and colleges' libraries. ASERL is partnering with the Digital Public Library of America to enable discovery of the Deeply Rooted collections once they are available online (see fig. 4).

Deeply Rooted is a step in the right direction to improve access to historical agricultural primary sources, but the scope of the project itself is so broad that anything related to agriculture may be included. If the CHARM project is used as an example of the sorts of collections that will be featured in Deeply Rooted, it can be expected that many collections submitted to Deeply Rooted will include not only the photographs, reports, and records of state extension services but also the diaries of farmers and plantation owners, business records, correspondence of agricultural and rural families, and commodity trade records (MSU Libraries, n.d.). Although these documents are important for recording the history of agriculture-related business and activities within the region, they do not specifically serve as the scholarly record of agricultural research produced by the region's land-grant universities. The scholarly record of research is contained in the historical state and local documents collections held by each respective land-grant, and these specific collections have been prioritized for preservation since Olsen's identification of the core literature of agriculture.

The CHARM and ASERL projects both show that coordination and support for the preservation of agricultural information at the state and regional level through consortia are possible. As shown in figure 5, most states are members of at least one regional or national consortium. The structure and coordinated effort among institutions outlined in ASERL's agricultural preservation projects may serve as a model for other regional consortia interested in preserving and providing access to state agricultural information.

Current Challenges, 2013–Present

Despite the ambitions of the 1993 NPPAL and the resulting significant achievements of projects that followed it, nearly a quarter-century later the goal of preserving the country's agricultural literature has been only partly fulfilled. For its part, NEH spent nearly $4.5 million on the state and local literature projects alone. This figure does not include in-kind contributions from the twenty-nine participating states. The states involved in the six phases of the NEH project completed the microfilm preservation of their targeted materials, while Cornell's CHLA project and its companion collection, the Home Economics Archive: Research, Tradition, History, digitized nearly 2 million pages of nationally important core books and journals. Certainly, some of the important literature of the twenty-

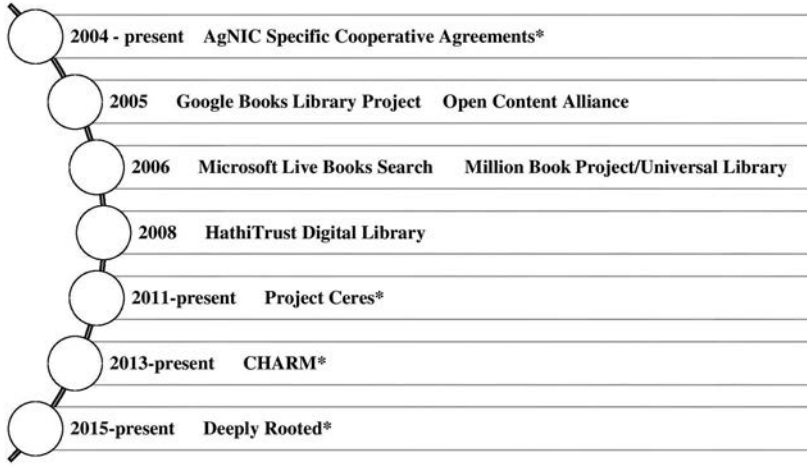

Figure 4. Large digitization projects timeline. Agriculture-focused projects are noted with an asterisk. This figure lists beginning dates for each project.

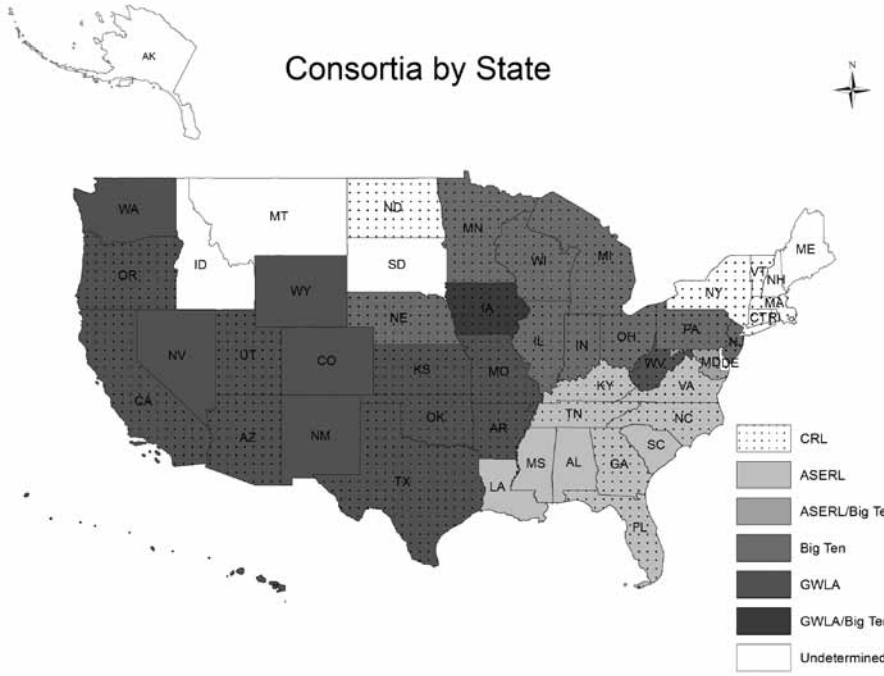

Figure 5. Consortia where a land-grant institution library is represented, 2016. This map was created by Sherry Roth of the Pennsylvania State University Libraries. See the appendix for a list of acronyms.

one states that did not participate in the NEH project have since been preserved either on microfilm or digitally. However, without coordinated tracking of the preservation of agricultural literature, it is difficult to determine the extent of what has been digitized (table 1).

So much has been digitized by so many agencies for so many years and hosted in so many different locations that to avoid the duplication of digitizing efforts requires a formidable amount of searching for preexisting digital versions of materials that must be completed at the outset of a project. Instead of building online collections that require the purchase and ongoing maintenance of local servers, many libraries have partnered together to build collaborative collections, such as those found in BHL and HathiTrust. These kinds of collections have distinct advantages, among them being the ability to scale to a degree difficult for individual libraries. BHL's worldwide consortium of natural history and botanical libraries "works with the international taxonomic community, rights holders, and other interested parties to ensure that biodiversity heritage is made available to a global audience through open access principles" (Rossi, 2006). Through a partnership with the Internet Archive, page scans of content are hosted at the Internet Archive, whereas the metadata for items are harvested, stored, and served up by BHL. This allows many institutions to collaboratively build large collections jointly; as BHL has a specific focus on taxonomies, Globally unique identifiers, or GUIDs, are applied to link to other taxonomic services (Gwinn & Rinaldo, 2009).

However, collaborative online collection building can present challenges to providing access to digitized collections, especially collections that contain federally funded information that is considered public domain under current copyright law. For example, post-1923 collections hosted by HathiTrust are use restricted to HathiTrust members. Considering that most state and local documents were produced for free distribution to the general public by land-grant institutions and were in part funded by the federal government through both the Morrill and Smith-Lever acts, HathiTrust's restrictions on access to land-grant agricultural publications is problematic. Even though federal documents have no copyright protection under U.S. law, documents produced by the states, including those produced by agricultural research stations and extension offices at land-grant universities, may be subject to copyright. Copyright law pertaining to state documents is not uniform among the states and territories (Harvard Library, n.d.). Volumes in HathiTrust published in the United States prior to 1923 are in the public domain and accessible to anyone online. Under its "Copyright" webpage, HathiTrust considers any documents published in the United States after 1923 to be protected by copyright law and hence makes them unavailable in full text to nonmember institutions (HathiTrust, n.d.-b). Therefore a state document published after 1923 would be unavailable for full text reading or downloading by users not affiliated with a HathiTrust member institution, even if that document is considered

Table 1. NEH and Project Ceres preservation and digitization projects by state*

	NEH PHASES 1–6			*PROJECT CERES*
State	*Bibliography*	*Microfilming*	*Digitization*	*Digitization and print preservation*
Alabama	•	•		•
Alaska				
Arizona	•		•	
Arkansas	•	•		•
California	•	•		
Colorado	•		•	•
Connecticut	•			
Delaware				
Florida	•	•		•
Georgia	•			
Hawaii	•	•		
Idaho				•
Illinois	•	•		
Indiana				•
Iowa	•	•		•
Kansas	•	•		•
Kentucky	•			
Louisiana				•
Maine				
Maryland	•	•		
Massachusetts				
Michigan	•	•		•
Minnesota	•	•		•
Mississippi				•
Missouri				•
Montana	•	•		
Nebraska	•	•		•
Nevada				
New Hampshire				
New Jersey				
New Mexico	•	•		•
New York	•	•		
North Carolina	•	•		
North Dakota	•			•
Ohio	•	•		•
Oklahoma	•			
Oregon				
Pennsylvania	•	•		
Rhode Island				
South Carolina				
South Dakota	•			
Tennessee				
Texas	•	•		
Utah				
Vermont				
Virginia				
Washington	•	•		•
West Virginia				•
Wisconsin	•	•		•
Wyoming				•

*As of 2016 the following states had not participated in the NEH project or Project Ceres: Alaska, Delaware, Maine, Massachusetts, Nevada, New Hampshire, New Jersey, Oregon, Rhode Island, South Carolina, Tennessee, Utah, Vermont, Virginia.

to be in the public domain by its state of origin. There are currently three options available to nonmember institutions to provide access to digitized state agricultural documents:

1. Join HathiTrust and provide access to users through it, which limits users to those affiliated as students, faculty, or staff of member institutions.
2. Digitize their own print copies of state agricultural documents and make them available within the institution's repository or digital library.
3. Obtain and submit Creative Commons licensing permissions from corporate authors and/or publishers of state agricultural experiment station and cooperative extension service publications for free, full-text access to digitized versions available through HathiTrust

The option that an institution decides to employ is dependent on the funding and resources available. For example, Louisiana State University (LSU) is currently in the process of completing a digitization project funded through CRL's Project Ceres to make LSU's state agricultural experiment station experiment bulletins and publications available through the Louisiana Digital Library, Internet Archive, and CRL. To facilitate the submission of Creative Commons permissions to release full-text views of documents in HathiTrust, Cornell is in the process of compiling detailed bibliographic records extraction from HathiTrust focusing on documents published by the New York State Agricultural Experiment Station, Cornell University Agricultural Experiment Station, and Cornell Cooperative Extension. Texas A&M and the University of Hawai'i at Mānoa have both initiated projects seeking permissions to make their state agricultural publications available through institutional repositories and HathiTrust. These institutions identified agricultural publications archived within HathiTrust, then contacted offices at their campuses for permission to free their documents from HathiTrust's viewing restrictions for nonmembers.

During the past decade, issues have arisen with the print preservation of agricultural information, and these issues are related to the dwindling storage space of print collections in academic libraries. As many such libraries can attest, library facilities are running out of space for their print collections. Demas and Lougee (2011) note that academic libraries are running out of room and space for print collections, and that "libraries are being pressured to reduce their physical footprints" (p. 1). In response to these pressures, libraries are withdrawing print holdings, especially print holdings that are duplicated in electronic subscriptions and in libraries across a particular region. Demas and Lougee identify shared print archiving as a method to "ensure that libraries forced to weed their print collections do not make mistakes and withdraw materials that should be retained" (p. 1). A number of shared/distributed print archiving programs for agricultural literature have been implemented to avoid loss of important agricultural scholarship.

In 2010 CRL was awarded an Institute of Museum and Library Services National Leadership Grant to develop print archives by domain (CRL, n.d.). CRL implemented print archiving in the domains of agriculture and law, and incorporated into its mission the preservation of agricultural literature, stating that "preserving agricultural history not only provides a window into the past, but documents the knowledge and practices of the time," and that the United States "has a rich history of agricultural information sharing" (Tanner, n.d.).

In 2012 ASERL implemented a large-scale, collaborative print-preservation program for print agricultural journals—the Cooperative Journal Retention project in which ASERL member universities and schools agree to retain print runs of selected journal titles. The project initially focused on the retention of agriculture-related journals among the participating institutions. In 2013 ASERL partnered with the Washington Research Library Consortium to create the Scholars Trust—a combining of the two organizations' print journal archives under a single retention and access agreement (ASERL, 2013). In 2015 the association announced that NAL would be a program affiliate of the Scholars Trust. NAL has committed to retain approximately 875 agriculture-related print journals (ASERL, 2015b). In a press release, ASERL's acting director commented that the "partnership between NAL and ASERL ensures that these hard-to-find print materials will be available for as long as they are useful and viable" (ASERL, 2015a).

Current projects specifically focused on the shared print retention of state and local documents include the University of Florida's disposition of state and local documents in its holdings to their institutions of origin, and in 2016 USAIN's Preservation and Digital Library Committee coordinated the disposition of several hundred volumes of withdrawn duplicate experiment station and extension publications held by Cornell's Experiment Station Library in Geneva, New York, to fill gaps in the collections of other land-grant libraries.

Conclusion

Even though the landscape of preservation is almost unrecognizable in comparison to that of the early 1990s, NPPAL continues to provide a framework for the ongoing work of agricultural preservation in the United States. Delivery systems, metadata standards, and methods of access to content will continue to change while the pressures on physical collections will undoubtedly continue to increase. Judgments and appeals over copyright will lift or place boundaries on what can be made available online, where, and for whom. At the same time, preservation staff turnover will continue to occur, making the retention of institutional memory of local and regional preservation work an additional challenge. The ever-changing nature of delivery platforms, the unpredictable future of private enterprise's involvement in digitization, securing funding and staffing, and the will of directors of land-grant libraries to commit to the cause of preserving the

literature of their collections and disciplines makes achieving the goals set forth by NPPAL a considerable though rewarding challenge. NPPAL's stated goal "to preserve in the original or in an archivally sound format—and make readily accessible to scholars, researchers, students, and scientists—the most important literature published before 1950 and the primary unpublished resources that together document the history of the agricultural sciences" is no less valid nearly a quarter-century later (Gwinn, 1993, p. 6). The commitment of dozens of faculty reviewers and library staff members and their directors to the land-grant mission, informed by the cooperative extension ethic of service to the public, has carried many of these projects through to fruition over the years. The dedication to this mission is fundamental to continuing the work remaining to be done if the important literature of all fifty states is to be fully represented online and preserved for perpetuity.

As with the process of freeing up access to content in HathiTrust documentation, past preservation efforts can provide useful data for current and future projects. The bibliographies that were created for the state and local literature projects, particularly the ranked ones, are essential to any future digitization efforts for state and local literature in agriculture and related disciplines because they provide a title list of the historical agricultural documents that have been identified as preservation priorities (Cook & Paulson, 2005). USAIN's Preservation and Digital Library Committee is actively seeking these bibliographies from across its membership to permanently archive in the USAIN preservation repository hosted by Cornell's Mann Library.

Questions still remain regarding which states may have digitized their holdings after 2008. Penn State uploaded many of its volumes to the Internet Archive, and Cornell digitized and uploaded many from New York into the CHLA collection, but determining what others have accomplished is difficult to ascertain. As NEH projects were suspended, institutions complied with project specifications to varying degrees: some included the suggested USAIN metadata in record notes while others did not, which has made following up with these institutions after a decade of suspended activity a challenge. USAIN's Preservation and Digital Library Committee, when tasked with contacting the phases 1 through 6 participants to confirm their extent of activities post-NEH funding, found that staff turnover had resulted in a loss of knowledge about the original projects. Librarians had departed for other institutions, retired, or moved into new roles. Staff lines within archives, such as preservation librarian positions, had been dropped or eliminated from organizations, resulting in a loss of support for preservation efforts. Institutions that did not participate in the NEH project phases may have digitized agricultural state and local documents independently. For example, LSU did not participate in any phases of the NEH project, but has digitized a number of sugar industry publications

listed as preservation priority titles, such as *Sugar Bulletin*. This project was funded by the American Sugar Cane League, and the digitized files are currently hosted on the Louisiana Digital Libraries website. Moreover, while the authors of this paper acknowledge that the issues surrounding the archiving and preservation of "born digital" agricultural content are also pressing, it is of an order of magnitude that surpasses the scope of the present paper.

As the NPPAL stated: "Libraries that are part of the land-grant community or that belong to USAIN have an obligation for the local care and maintenance of the collections" (Gwinn, 1993, p. 18). This has always been both a challenge and an opportunity, given the digital revolution that continues to remake the landscape of agricultural preservation into a complex, ever-changing arena. Despite the declining numbers of preservation staff in libraries, librarians dedicated to agricultural preservation are continuing efforts to bring coordination, collaboration, sound metadata, funding, and dedicated leadership to the cause. Very few of these staff members have full-time preservation duties in their job descriptions, and the work being done is largely on an "other duties as assumed" basis at a time when the libraries in which they work are being squeezed for space and dollars. Theirs is an effort to save our nation's agricultural literature not only from deterioration but also from obscurity by making this important body of work more accessible than ever.

Appendix: List of Acronyms

AgNIC	Agriculture Network Information Collaborative
ARL	Association of Research Libraries
ASERL	Association of Southeastern Research Libraries
BHL	Biodiversity Heritage Library
CHARM	Consortium for the History of Agricultural and Rural Mississippi
CHLA	Core Historical Literature of Agriculture
CRL	Center for Research Libraries
GWLA	Greater Western Library Alliance
NAL	National Agriculture Library
NEH	National Endowment for the Humanities
NPPAL	National Preservation Program for Agricultural Literature
USAIN	United States Agricultural Information Network

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